

# **STATES GUIDANCE DOCUMENT**

## **POLICY PLANNING TO REDUCE GREENHOUSE GAS EMISSIONS**

Second Edition

**U.S. Environmental Protection Agency  
Office of Policy, Planning and Evaluation  
State and Local Climate Change Program  
Washington, DC 20460**

**May 1998**

## TABLE OF CONTENTS

|                  |   |             |
|------------------|---|-------------|
| <b>CHAPTER 1</b> | <b>INTRODUCTION .....</b>   | <b>1-1</b>  |
| <b>1.1</b>       | <b>PURPOSE .....</b>  | <b>1-1</b>  |
| <b>1.2</b>       | <b>ORGANIZATION OF THE DOCUMENT .....</b>   | <b>1-2</b>  |
| <br>             |   |             |
| <b>PART I:</b>   | <b>INITIATION OF CLIMATE CHANGE PROGRAMS .....</b>  | <b>1-1</b>  |
| <br>             |   |             |
| <b>CHAPTER 2</b> | <b>BACKGROUND ON CLIMATE CHANGE SCIENCE AND POLICY .....</b>  | <b>2-1</b>  |
| <b>2.1</b>       | <b>INTRODUCTION TO CLIMATE CHANGE .....</b>   | <b>2-1</b>  |
| <b>2.1.1</b>     | <b>Scientific and Technical Aspects<br/>                    of Global Climate Change .....</b>                    | <b>2-1</b>  |
| <b>2.1.2</b>     | <b>Potential Impacts of Global Climate Change .....</b>   | <b>2-2</b>  |
| <b>2.2</b>       | <b>POLICY CONTEXT FOR CLIMATE CHANGE MITIGATION .....</b>   | <b>2-6</b>  |
| <b>2.2.1</b>     | <b>Introduction to International and National Responses to Climate Change .....</b>                               | <b>2-7</b>  |
| <b>2.2.2</b>     | <b>Importance of State Action .....</b>   | <b>2-11</b> |
| <b>2.3</b>       | <b>GENERAL FRAMEWORKS FOR CLIMATE CHANGE POLICY ANALYSIS .....</b>  | <b>2-14</b> |
| <b>2.3.1</b>     | <b>Barriers to Emission Reductions .....</b>  | <b>2-15</b> |
| <b>2.3.2</b>     | <b>Structure of Policy Approaches .....</b>   | <b>2-17</b> |
| <b>2.3.3</b>     | <b>Timing Issues in Policy Development .....</b>  | <b>2-19</b> |
| <br>             |   |             |
| <b>CHAPTER 3</b> | <b>MEASURING AND FORECASTING GREENHOUSE GAS EMISSIONS .....</b>   | <b>3-1</b>  |
| <b>3.1</b>       | <b>MEASURING CURRENT EMISSIONS .....</b>  | <b>3-1</b>  |
| <b>3.2</b>       | <b>FORECASTING FUTURE EMISSIONS .....</b>   | <b>3-1</b>  |
| <br>             |   |             |
| <b>CHAPTER 4</b> | <b>ESTABLISHING EMISSIONS REDUCTION PROGRAM GOALS AND<br/>EVALUATIVE CRITERIA .....</b>                           | <b>4-1</b>  |
| <b>4.1</b>       | <b>EXAMPLES OF GREENHOUSE GAS REDUCTION GOALS .....</b>   | <b>4-1</b>  |
| <b>4.2</b>       | <b>COMPLEXITIES IN EMISSIONS REDUCTION GOAL SETTING .....</b>   | <b>4-3</b>  |
| <b>4.2.1</b>     | <b>Four Variable Aspects of Goal Setting Processes .....</b>  | <b>4-3</b>  |
| <b>4.2.2</b>     | <b>Complications that Affect Goal Setting .....</b>   | <b>4-4</b>  |
| <b>4.3</b>       | <b>ESTABLISHING CRITERIA FOR EVALUATING POLICIES .....</b>  | <b>4-6</b>  |
| <br>             |   |             |
| <b>PART II:</b>  | <b>TECHNICAL APPROACHES AND POLICY OPTIONS FOR REDUCING<br/>GREENHOUSE GAS EMISSIONS .....</b>                    | <b>II-1</b> |
| <br>             |   |             |
| <b>CHAPTER 5</b> | <b>TECHNICAL APPROACHES AND SOURCE-SPECIFIC POLICY OPTIONS .....</b>  | <b>5-1</b>  |
| <b>5.1</b>       | <b>GREENHOUSE GASES FROM ENERGY CONSUMPTION:<br/>DEMAND SIDE MEASURES .....</b>                                   | <b>5-3</b>  |
| <b>5.1.1</b>     | <b>Technical Approaches for Improving Energy Efficiency and Reducing<br/>                    Energy Use .....</b> | <b>5-7</b>  |
| <b>5.1.2</b>     | <b>Direct State Actions to Promote Energy Efficiency .....</b>  | <b>5-9</b>  |
| <b>5.1.3</b>     | <b>Policies to Promote Energy Efficiency, Renewable Energy, and Carbon<br/>                    Offsets .....</b>  | <b>5-13</b> |

|                  |   |            |
|------------------|---|------------|
| 5.1.4            | Conserve Energy through Improved Industrial, Agricultural, and<br>Municipal Waste Management Processes .....          | 5-14       |
| 5.1.5            | Promote Urban Tree Planting.....  | 5-16       |
| 5.2              | GREENHOUSE GASES FROM ENERGY PRODUCTION: SUPPLY SIDE<br>MEASURES .....  | 5-17       |
| 5.2.1            | Reduce Greenhouse Gas Emissions from Electricity Generation.....  | 5-19       |
| 5.2.2            | Reduce Emissions Through On-Site Power Production .....   | 5-21       |
| 5.3              | GREENHOUSE GASES FROM THE TRANSPORTATION SECTOR .....   | 5-22       |
| 5.3.1            | Reduce Vehicle Miles Traveled (VMT).....  | 5-23       |
| 5.3.2            | Reduce Emissions per Mile Traveled.....   | 5-26       |
| 5.3.3            | Use Alternative Fuels.....  | 5-27       |
| 5.4              | METHANE FROM NATURAL GAS AND OIL SYSTEMS .....  | 5-29       |
| 5.5              | METHANE FROM COAL MINING .....  | 5-31       |
| 5.5.1            | Methane Recovery and Use .....  | 5-32       |
| 5.5.2            | Reduce Coal-Fired Energy Consumption.....   | 5-35       |
| 5.6              | METHANE FROM LANDFILLS .....  | 5-36       |
| 5.6.1            | Methane Gas Recovery .....  | 5-36       |
| 5.6.2            | Keeping the Organic Fraction of Municipal Solid Waste Out of Landfills .....  | 5-39       |
| 5.7              | METHANE EMISSIONS FROM DOMESTICATED LIVESTOCK .....   | 5-40       |
| 5.7.1            | Improve Production Efficiency Per Animal.....   | 5-41       |
| 5.7.2            | Improve Overall Production Efficiency of Animal Products by<br>Matching Animal Products to Customer Preferences ..... | 5-42       |
| 5.8              | METHANE FROM MANURE MANAGEMENT .....  | 5-43       |
| 5.8.1            | Methane Recovery and Use .....  | 5-44       |
| 5.8.2            | Increase Aerobic Treatment of Livestock Manure .....  | 5-46       |
| 5.9              | METHANE FROM RICE CULTIVATION .....   | 5-47       |
| 5.10             | NITROUS OXIDE AND OTHER GREENHOUSE GASES FROM<br>FERTILIZER USE.....  | 5-50       |
| 5.10.1           | Improve Nitrogen-Use Efficiency in Fertilizer Application .....   | 5-50       |
| 5.10.2           | Replace Industrially-Fixed Nitrogen Based Fertilizers with Renewable<br>Nitrogen Source Fertilizers .....             | 5-53       |
| 5.11             | EMISSIONS ASSOCIATED WITH FORESTED LANDS .....  | 5-55       |
| 5.11.1           | Maintain Carbon Storage Capacity of Existing Forests.....   | 5-56       |
| 5.11.2           | Improve Productivity of Existing Forest Lands .....   | 5-58       |
| 5.11.3           | Integrate Climate Change Concerns into Fire Management Policies .....   | 5-60       |
| 5.11.4           | Integrate Climate Change Concerns into Pest Management Policies .....   | 5-61       |
| 5.11.5           | Institute Policies to Affect Demand for Forest Products .....   | 5-62       |
| 5.12             | GREENHOUSE GASES FROM BURNING OF AGRICULTURAL WASTES .....  | 5-64       |
| 5.12.1           | Plow Residue Back Into Soil .....   | 5-65       |
| 5.12.2           | Remove Crop Residues and Develop Alternative Uses .....   | 5-66       |
| 5.12.3           | Use Alternative Burning Techniques .....  | 5-68       |
| 5.12.4           | Replace with Alternative Crops .....  | 5-69       |
| <b>CHAPTER 6</b> | <b>CROSS-CUTTING THEMES AND PROGRAM DEVELOPMENT .....</b>   | <b>6-1</b> |
| 6.1              | ENERGY CONSERVATION, RENEWABLE ENERGY, AND CARBON<br>OFFSETS IN THE ELECTRICITY SECTOR .....                          | 6-1        |
| 6.2              | MUNICIPAL SOLID WASTE MANAGEMENT .....  | 6-4        |
| 6.3              | BIOMASS ENERGY DEVELOPMENT .....  | 6-8        |
| 6.4              | TREE AND TIMBER EXPANSION PROGRAMS .....  | 6-10       |

|   |  |              |
|---|--|--------------|
| 6.5   | CITY AND REGIONAL PLANNING .....   | 6-12         |
| 6.6   | AGRICULTURAL SECTOR PLANNING .....   | 6-14         |
| <b>PART III: PROGRAM DEVELOPMENT AND STATE ACTION PLAN PREPARATION ....</b> |  | <b>III-1</b> |
| <b>CHAPTER 7</b>  | <b>CLIMATE CHANGE PROGRAM DEVELOPMENT .....</b>  | <b>7-1</b>   |
| 7.1   | TIME PERSPECTIVES IN CLIMATE CHANGE PROGRAM DESIGN .....   | 7-1          |
| 7.1.1   | Structuring Time Frame Considerations in Program Design .....  | 7-1          |
| 7.1.2   | Models for Including Time Frame Considerations in Program Development .....                              | 7-3          |
| 7.2   | IMPORTANT ACTORS IN CLIMATE CHANGE PROGRAM DESIGN .....  | 7-4          |
| 7.3   | POLITICAL CONSIDERATIONS IN PROGRAM DEVELOPMENT .....  | 7-5          |
| 7.3.1   | Developing Programs and Processes That Foster Broad-Based Political Support .....                        | 7-6          |
| 7.3.2   | Using Policies Strategically Within the Time Frames of Program Development .....                         | 7-6          |
| 7.3.3   | Utilizing Legislative and Executive Action Strategically When Feasible .....                             | 7-7          |
| 7.4   | COORDINATING CLIMATE CHANGE PROGRAMS: INTERACTION BETWEEN AGENCIES .....                                 | 7-7          |
| 7.4.1   | Partnerships Between State Agencies .....  | 7-7          |
| 7.4.2   | Interaction With Federal and Local Agencies .....  | 7-8          |
| 7.4.3   | Structuring Partnerships/Program Coordination and Administration .....                                   | 7-10         |
| 7.5   | CLIMATE CHANGE PROGRAM FINANCING .....   | 7-10         |
| <b>CHAPTER 8</b>  | <b>ANALYZING POLICY OPTIONS .....</b>  | <b>8-1</b>   |
| 8.1   | ESTABLISHING A CONSISTENT FRAMEWORK FOR POLICY ANALYSIS .....  | 8-1          |
| 8.1.1   | Structure of the Policy Analysis Framework .....   | 8-1          |
| 8.1.2   | Application of the Policy Analysis Framework .....   | 8-2          |
| 8.2   | ESTIMATING BENEFITS .....  | 8-4          |
| 8.2.1   | Using Greenhouse Gas Emissions Reductions as a Proxy for the Benefits of Mitigating Climate Change ..... | 8-5          |
| 8.2.2   | Considering the Ancillary Environmental and Social Benefits of Emissions Reduction Policies .....        | 8-5          |
| 8.2.3   | Considering the Political and Institutional Benefits of Addressing Climate Change .....                  | 8-7          |
| 8.3   | ESTIMATING COSTS .....   | 8-7          |
| 8.3.1   | Process for Calculating Social Costs .....   | 8-8          |
| 8.3.2   | Complications Associated with Social Cost Calculation .....  | 8-10         |
| 8.4   | ESTIMATING OTHER IMPACTS .....   | 8-11         |
| 8.5   | GENERAL COMPLEXITIES IN ESTIMATING POLICY IMPACTS .....  | 8-12         |
| 8.6   | BASIC METHODOLOGIES FOR EVALUATING CLIMATE CHANGE ISSUES .....   | 8-14         |
| 8.7   | MORE COMPLEX TECHNICAL TOOLS FOR ASSESSING GREENHOUSE GAS POLICIES .....                                 | 8-18         |
| <b>CHAPTER 9</b>  | <b>PREPARING THE STATE ACTION PLAN .....</b>   | <b>9-1</b>   |
| 9.1   | EXECUTIVE SUMMARY .....  | 9-1          |
| 9.2   | BACKGROUND ON THE SCIENCE OF CLIMATE CHANGE .....  | 9-1          |
| 9.3   | REGIONAL AND LOCAL RISKS AND VULNERABILITIES .....   | 9-2          |

|  |   |                     |
|--|---|---------------------|
| <b>9.4</b>   | <b>1990 AND FORECAST BASELINE EMISSIONS .....</b>               | <b>9-2</b>          |
| <b>9.5</b>   | <b>GOALS AND TARGETS .....</b>                                  | <b>9-2</b>          |
| <b>9.6</b>   | <b>ALTERNATIVE POLICY OPTIONS .....</b>                         | <b>9-2</b>          |
| <b>9.7</b>   | <b>IDENTIFICATION AND SCREENING OF MITIGATION ACTIONS .....</b> | <b>9-2</b>          |
| <b>9.8</b>   | <b>FORECAST IMPACTS OF MITIGATION .....</b>                     | <b>9-2</b>          |
| <b>9.9</b>   | <b>RECOMMENDATIONS AND STRATEGY FOR IMPLEMENTATION .....</b>    | <b>9-3</b>          |
| <br><b>GLOSSARY .....</b>  |   | <b>G-1</b>          |
| <br><b>REFERENCES .....</b>  |   | <b>R-1</b>          |
| <br><b>STATE ACTION PLANS .....</b>  |   | <b>Appendix 1-1</b> |
| <br><b>MOCKUP OF A STATE PLAN TO REDUCE GREENHOUSE GAS EMISSIONS<br/>THROUGH IMPROVED SOLID WASTE MANAGEMENT PRACTICES .....</b> |   | <b>Appendix 2-1</b> |